

Vision Statement for the Everglades Wetland Research Park at Florida Gulf Coast University





August 15, 2012

Greetings!

I am excited to introduce our newest research and teaching venture at Florida Gulf Coast University—the Everglades Wetland Research Park (EWRP) in Naples, Florida.

This new environmental program, housed in our new 10,000 square-foot Harvey Kapnick Education and Research Center at the Naples Botanical Garden, will be directed by our new (as of October 2012) FGCU Professor and Juliet C. Sproul Chair for Southwest Florida Habitat Restoration and Management, William J. Mitsch. Professor Mitsch comes to FGCU from The Ohio State University with world-class credentials in wetland science and ecological engineering. He is the author of the definitive college textbook on the subject—Wetlands, is a recipient of the 2004 Stockholm Water Prize in Sweden and a 2010 Einstein Professorship from China, and is described by some as the world's preeminent wetland scientist. As a former graduate student at the University of Florida in Gainesville, he is returning home to Florida—to the ecologically rich waters that started his career in the 1970s.

Professor Mitsch is ably supported in this new center by his long-time assistant, Dr. Li Zhang, and by an established research team of graduate students and research staff who are already at the Kapnick Center.

This report presents the vision for what we hope will become a preeminent research program at Florida Gulf Coast University in cooperation with the Naples Botanical Garden. The report is full of inspiring ideas for future collaboration as well as some new programs that we have already scheduled, such as the exciting 2012-13 Moonlight on the Marsh lecture series. The Greater Florida Everglades—wetlands, sloughs, rivers, and coastal mangrove swamps—provide priceless ecosystem services for Southwest Florida, serving as the habitat for some of the richest biodiversity on the planet while protecting our coastline water quality and the economic viability of our shoreline and Gulf. Most important, our new research program is perfectly attuned to the vision set forth by FGCU when it was established 16 years ago.

I warmly invite you to visit with Drs. Mitsch and Zhang and their research team at the Kapnick Environmental Center, located at the Naples Botanical Garden. They will be delighted to give you a tour of their new teaching and research facilities here in Southwest Florida and to share further information on their research projects.

They look forward to hearing from you.

Best regards,



Donna Henry



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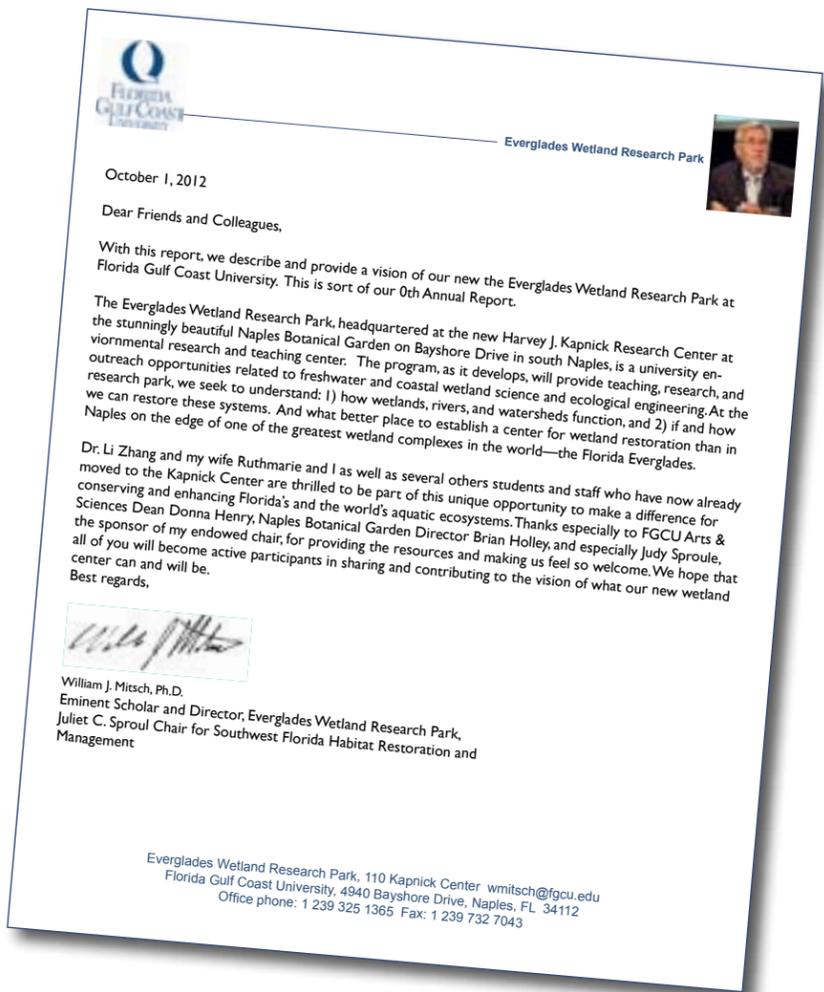
Why Wetlands?

Wetlands are shallow to intermittently flooded ecosystems that are more commonly known by such terms as swamps, bogs, marshes, and sedge meadows. They are now revered and protected as important parts of the natural landscape because of their functions in cleaning and retaining water naturally, preventing floods, and providing a habitat and food source for a wide variety of plant and animal species. Wetlands may also be a linchpin of climate change because of their ability to sequester carbon. Southern Florida is a wetland haven, with one of the most biologically rich wetland complexes in the world. The 13,000 square mile (34,000 square kilometer) Greater Florida Everglades, which includes the marsh and tree-island "river of grass" to the east, the Big Cypress Swamp region to the west, and the coastal mangroves and Florida Bay to the southern and southwest, is a marvel around the world.

It is estimated that more than half of the original wetlands in the lower 48 states have been lost to drainage projects and human development projects. Florida, second only to Alaska in terms of original wetlands, has lost 46 percent of its original wetlands for urban and agricultural development. When we lose wetlands, we lose their ability to provide clean water, prevent floods, and enhance biological diversity. Many organizations are calling for the creation and restoration of wetlands to clean up our streams

and rivers, and for river and floodplain restoration to recover lost habitat and other ecosystem services. Five million acres of wetlands in the Mississippi River Basin have been suggested as necessary to help prevent the dead zone, or hypoxia, in the Gulf of Mexico. Large wetland restorations, at costs of billions of dollars, are underway in our Florida Everglades, the Louisiana Delta, and the Mesopotamian Marshlands of Iraq. Coastal wetlands are needed more than ever for protection of human settlements from disasters such as the 2004 Indian Ocean tsunami, the 2005 Hurricane Katrina in New Orleans, and even the 2010 Gulf of Mexico oil spill.

The U.S. Army Corps of Engineers oversees a regulatory program that results in tens of thousands of acres of wetlands being restored and created each year to replace wetlands that are lost to development. A National Academy of Sciences panel concluded that much more research is needed before we can be assured that those wetlands that are constructed to replace wetlands destroyed for development are successful. The question of whether we can create and restore sustainable rivers and wetlands remains unanswered. We are optimistic that we can, but much research is needed and education of the next generation in how to do it is imperative.



RESEARCH

Research is a primary focus of the Everglades Wetland Research Park. In the future, we expect to have many faculty, postdocs, graduate students, student interns, and staff frequenting the offices and labs of the beautiful new Kapnick Center doing research that is key to the survival of our ecosystems and indeed our planet. Several research projects are already active at the EWRP in 2012 are listed here.

Everglades Restoration

This study, begun with a contract to The Ohio State University from the South Florida Water Management District and now continuing at Florida Gulf Coast University, is focused on estimating the efficacy of different wetland plant communities for reducing phosphorus input into the Florida Everglades. This project is a part of the overall Everglades Restoration where 40,000 acres of wetlands, called Stormwater Treatment Areas (STAs) have been created at former sugar farms that had, in turn, replaced wetlands decades ago. It is especially important that we find if certain types of wetland communities (habitats) are better than others in reducing phosphorus inputs to the Florida Everglades, thus reducing the invasion of plants such as Typha (cattails) from taking over the native Cladium (sawgrass) in the Everglades "river of grass."

Support: South Florida Water Management District and Everglades Wetland Research Park



Carbon Fluxes in Everglades Wetland Ecosystems

Corkscrew Swamp—considered by some to be one of the world's most majestic wetlands and now designated as the 30th Ramsar Wetland of International Importance in the USA—was chosen as a convenient site for comparing different wetland ecosystems in the Everglades—sawgrass marshes, bald cypress swamps, pond cypress swamps, and pine flatwoods—for their ability to sequester climate-changing carbon emitted from cars and fossil-fuel power plants into permanent soil storage as well as for their emissions of the greenhouse gas methane. These measurements will ultimately help to estimate the net effect of wetland ecosystems such as those at Corkscrew in the cooling or warming of the planet.

Support: Colombia international graduate student support administered by LASPAU; Corkscrew Swamp Sanctuary; and Everglades Wetland Research Park

Methane Emissions from Created Wetlands

Created wetlands may or may not contribute to climate change because of they both sequester carbon but they also emit the greenhouse gas methane. Studies of methane emissions begun in 2003 at the Olenkyng River Wetland Research Park will continue through 2013, working in collaboration with large-scale methane emission estimates from an eddy covariance tower created at this site. A companion flow-through created wetland site in Florida will be chosen to give results a wider latitudinal application.

Support: National Science Foundation

Coastal Mangrove Restoration

Opportunities for establishing a long-term mangrove wetland restoration demonstration project at the Naples Botanical Garden are being investigated (see pages 6 and 7). The wetland site, over 100 acres in size and located on the southern edge of the Garden, is called the Collier Enterprises South Wetlands Preserve. It has already been managed for invasive plant removal and has been planted with some salt marsh species. Already we have installed a water quality monitoring device that sends real-time data back to the Kapnick Center. In collaboration with the Ph.D. graduate student finishing at The Ohio State University, the EWRP is investigating mathematical models and other approaches for estimating the connectivity of the site with Naples Bay. We will also be investigating ways to enhance that tidal exchange which is so essential for a healthy coastal wetland.

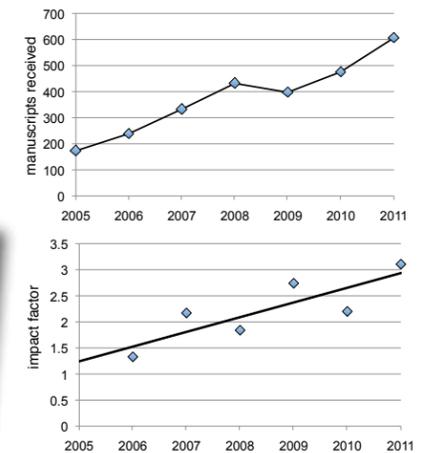
Support: Everglades Wetland Research Park; Naples Botanical Garden, and The Ohio State University



Publications and Scholarship

One of the key measures of productivity of university research centers is the number and quality of peer-reviewed papers published in national and international scientific journals. We expect to report significant productivity in that category for years to come. The record that we bring from 2012-13 are 14 papers and edited volumes on an assortment of topics including water quality management, wetland restoration, carbon sequestration in wetlands, and ecological engineering. A list of those papers is included here.

We are also establishing the editorial home of the international peer-reviewed journal Ecological Engineering at the Everglades Wetland Research Park. Now in its 21st year, this journal explores the successes and failures of created and restored ecosystem projects around the world. Authors of articles from around the world will now see that the home of this journal is SW Florida and Florida Gulf Coast University. The number of submitted papers and impact factor trend for the journal continue to grow with remarkable progress. Ecological Engineering recently received a 2011 IF (impact factor) of 3.11, ranking it high in environmental science and engineering journals in the world.



Current publications by Everglades Wetland Research Park team 2013 and in press

- Batson, J., W.J. Mitsch, and U. Mander. in press. Denitrification and a nitrogen budget of created riparian wetlands. *Journal of Environmental Quality*
- Bernal, B. and W.J. Mitsch. in final revision. Carbon sequestration in tropical freshwater wetlands. *Biogeochemistry*
- Junk, W.J., S. An, H. Cizkova, C. M. Finlayson, B. Gopal, J. Kvet, S.A. Mitchell, W. J. Mitsch and R.D. Roberts. in press. Current state of knowledge regarding the world's wetlands and their future under global climate change: A synthesis. *Aquatic Sciences*
- Mitsch, W.J. in press. Wetland Creation and Restoration. *Encyclopedia of Biodiversity*, 2nd ed. S. Levin, ed. Elsevier, Amsterdam.
- Mitsch, W.J. and M. Hernandez. in press. Landscape and climate change threats to wetlands of North and Central America. *Aquatic Sciences*
- Mitsch, W.J., A.M. Nahlik, B. Bernal, L. Zhang, C.J. Anderson, S.E. Jørgensen, U. Mander, and H. Brix. in press. Wetlands, carbon, and climate change. *Landscape Ecology*

TEACHING AND OUTREACH

The Harvey J. Kapnick Center has several room specific for teaching university and outreach classes including our 1300-square foot LaGrippe Family laboratory classroom and two smaller but more flexible meeting rooms/classrooms that we share with the Naples Botanical Garden. We plan to encourage FGCU faculty teaching appropriate ecology and environmental courses to use these great facilities. We also expect our Moonlight on the Marsh lecture series (described below) to lead to mini-courses and discussion group classes with the visiting scientists.

Professional Short Courses

We also expect to teach short courses for professionals such as the Wetland Creation and Restoration course co-taught by Professor Mitsch and long-time mangrove wetland specialist Robin Lewis in early November 2012 at the Kapnick Center. Short courses such as these are marketed to a national audience but we also expect local participants as well.

Moonlight on the Marsh Distinguished Lectures

One of the early focuses of our new Everglades Wetland Research Park is an effort to bring the greatest minds in wetland restoration, ecology, and water resources, to the Kapnick Center to interact with our students, researchers, and the general public. In 2012-13 we have designed our initial Moonlight on the Marsh lecture series with that concept in mind. The 8 distinguished lecturers we have included in the 2012-13 program come from Mexico, Denmark, and 5 states in the USA and bring expertise in coastal and inland wetland restoration, ecological modeling, Florida alligators, migratory birds associated with wetlands. Most lectures will be held in the 2,100-square foot auditorium at the Kapnick Center in the early evening so that local residents of SW Florida and professional from elsewhere in Florida can attend. The Moonlight on the Marsh lectures will be designed for both researchers and the general public. We will also encourage the lecturers to spend several weeks with us and we will be renting an apartment for such visitors so that long visits can be economically done.



2012-13 MOONLIGHT ON THE MARSH LECTURE SERIES

Seminars at 7 in the evening

sponsored by EVERGLADES WETLAND RESEARCH PARK, Florida Gulf Coast University at the Kapnick Center, Naples Botanical Garden, Naples Florida

Thursday October 18, 2012

Ecology and Management of Tropical Wetlands in Mexico

Maria Hernandez, Ph.D., Environmental Biotechnology Unit, Institute of Ecology, Xalapa, Veracruz, Mexico

Thursday November 15, 2012

Lessons on Human Reproductive Health from Florida's Alligators

Louis J. Guillette Jr., Ph.D., Endowed Chair for Marine Genomics and Professor of Obstetrics and Gynecology; Marine Biomedicine and Environmental Sciences, Medical University of South Carolina & Hollings Marine Laboratory, Charleston, South Carolina

Saturday January 12, 2013 (collaboration with Naples Botanical Garden)

Working Worldwide to Conserve Cranes and the Wetland, Grassland and Other Ecosystems on Which They Depend

George Archibald, Director, International Crane Foundation, Baraboo, Wisconsin

Thursday January 24, 2013

Ecological Engineering of the Best Kind: Restoring Rivers, Wetlands, and the Florida Everglades

William J. Mitsch, Ph.D., Juliet C. Sproul Chair for Southwest Florida Habitat Restoration and Management and Director, Everglades Wetland Research Park, Florida Gulf Coast University, Naples, Florida

Thursday February 7, 2012 (at Ft. Myers Campus)

SAMSØ—A Danish Island Based on Renewable Energy

Sven Erik Jørgensen, Ph.D., Professor Emeritus, Copenhagen University, Copenhagen, Denmark

Thursday February 21, 2013

Florida's Endangered Mangroves and Their Protection and Restoration as a Lesson for Mangrove Management Around the World

Roy R. "Robin" Lewis III, M.A., P.W.S., President, Lewis Environmental Services, Inc. President, Coastal Resources Group, Inc., Salt Springs, Florida

Thursday March 7, 2013

Factors Affecting Sustainability of the Mississippi River Delta and Basin

John W. Day, Ph.D. Professor Emeritus, School of Coast and Environment, Louisiana State University, Baton Rouge, Louisiana

Thursday March 21, 2013 (at Sanibel Island or Ft. Myers Campus)

Nutrient Farming in the American Midwest to Protect the Gulf of Mexico

Donald L. Hey, Ph.D., Founder, The Wetlands Initiative and Des Plaines River Wetland Demonstration Project, Chicago and Lake County, Illinois



THE VISION

The new 10,000 square-foot Harvey J. Kapnick Center, the adjacent Naples Botanical Garden and its natural areas, and our proximity to Naples Bay and the coastline to the west and the Florida Everglades to the east give us a marvelous opportunity to develop one of the more exciting wetland and aquatic ecosystem research facilities in the country. We have already begun to develop some of the ideas described here in collaboration with the Garden, other FGCU faculty and staff, Rookery Bay Estuarine National Estuarine Research Reserve, the South Florida Water Management District, the cities of Naples, Ft. Myers, and Cape Coral, Collier and Lee counties, and local businesses.

MAIN RESEARCH LABORATORY

We are equipping the main Research Laboratory in the Kapnick Center with \$250,000 in new state-of-the-art equipment that will allow us to continue and even accelerate our past research in wetland and river biogeochemistry and ecology. The equipment includes a total organic carbon analyzer for determining carbon content in soils, water, and vegetation, a gas chromatograph for estimating greenhouse gas emissions, a cesium-detection instrument for estimating carbon sequestration in wetlands, and a GC-MS system for estimating a variety of organic chemicals including trace amounts of petroleum products in plants, water, and sediments. Along with an existing gas chromatograph, water quality analyzer capable of estimating low concentrations of nitrogen and phosphorus, and balances and other laboratory supplies ordered as part of the building construction, this laboratory will be frequently used by researchers on research grants and for graduate student master's theses and doctoral student dissertations.



LOBBY PLAN

We plan to redesign the open room adjacent to our offices in the NE corner of the Kapnick building to be an active and much visited lobby—the “home” of the Everglades Wetland Research Park. In fact, it can be a named lobby similar to the Ruth Smart Lobby in the Heffner Wetland Building at the Olentangy River Wetland Research Park at Ohio State University. The lobby will become a “destination” for additional visitors to the Naples Botanical Garden interested in the environment and wetland conservation. The lobby will include large LED TV screens that will continuously display real-time water quality data from sites throughout south Florida (see WATER QUALITY NETWORK below), a world map that shows our international network of sister wetland research facilities (in a network called Global Wetland Consortium), a Florida map that shows our research sites in the state, photos and continuous slide presentations of Florida wetlands, field research, and current events such as the Moonlight on the Marsh lectures and short courses. We will also begin a sequence of framed press clippings and other news stories related to our new Center. Clocks giving the time at several major wetlands around the world will also be mounted on the wall. A fish tank display showing some of the smaller wetland plants and critters from SW Florida and a few modest pieces of furniture and lighting for visitors to relax and read our reports and publications will also be included in this lobby.



WATER QUALITY NETWORK

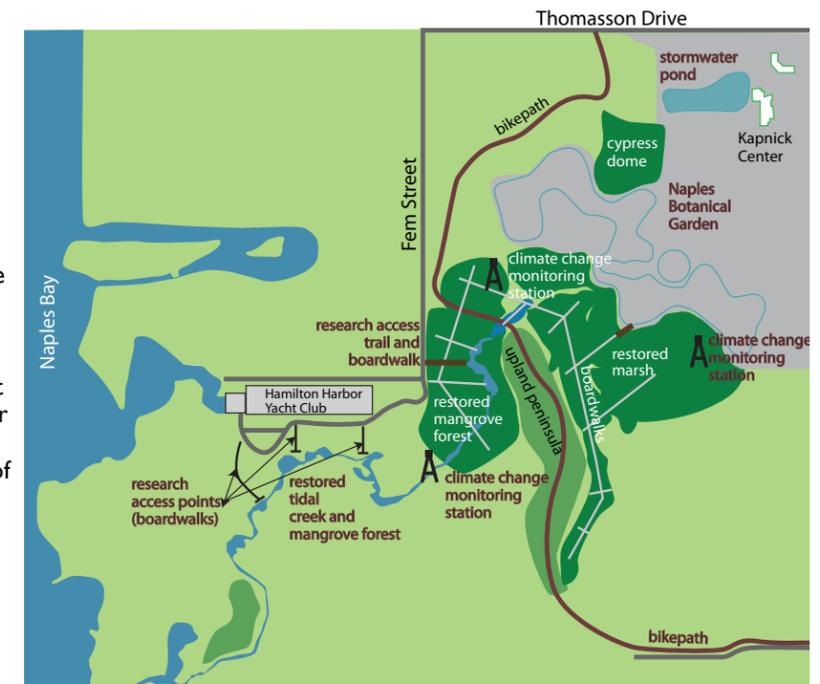
We plan to establish real-time wireless water quality monitoring systems in a number of locations throughout south Florida. We have already established one such monitoring system in the Collier Enterprises South Wetlands Preserve at the Naples Botanical Gardens and the data from the system is sent by radio wave to the Kapnick Center. When the lobby design is completed, a LED screen will continuously show real-time data from this wetland. We are currently investigating similar real-time water quality monitoring sites for display in our lobby at SFWMD's stormwater treatment wetlands near West Palm Beach, Corkscrew Swamp Sanctuary, and Naples Pier.



LONG-TERM TROPICAL WETLAND RESTORATION (LTTWR)

The Collier Enterprises South Wetlands Preserve at the Naples Botanical Gardens offers one of the most exciting sites for long-term coastal restoration research of any location in SW Florida. We are now engaged in discussions about this idea. The wetland, currently more a brackish marsh that an emerging mangrove swamp, receives freshwater runoff from the Garden and limited flux of seawater from Naples Bay. We envision this wetland becoming a premier mangrove wetland restoration demonstration site, with easy access for frequent site measurements by researchers from the Everglades Wetland Research Park and proximity to the labs in the Kapnick Center. Most important, because it is secure in its location next to the Naples Botanical Garden, the wetland succession can be studied for decades with little concern for site alteration. We are also exploring with mathematical models an enhancement of the site by restoring its connection to Naples Bay. The drawing (at right) shows the location a partially filled tidal creek that could be re-excavated to make this reconnection. Other routes are possible too but reconnecting coastal wetlands to their coastal system is a fundamental principle of improving these ecosystems.

If this wetland were purposefully reconnected to Naples Bay, there would be many opportunities for obtaining research support for scientific work from the National Science Foundation, the US EPA, and NOAA among other organizations. Without that “experimental” twist, extramural support is unlikely.



DEVELOPMENT

The Everglades Wetland Research Park needs your help to take this “vision” to the next level. While we can do our part and find grants and contracts to support students, there are many needs in running a research program of this size that do not easily translate to contracts and grants. This is especially true for infrastructure items. Donations are needed for a boardwalk system, towers and monitoring for monitoring greenhouse gases, and more water quality monitoring stations in the Naples Botanical Garden restoration wetland. Lab supplies for students who are not formally funded for them to do their thesis research are always in short supply. There is a need for a “site engineer” endowment for an undergraduate student to maintain the infrastructure at the Garden restoration wetland and elsewhere. There is always the need for donations of boats and vehicles or the cash to buy them, especially as we are getting started. Naming opportunities exist for the new lobby, the boardwalk system, and xxxxxxx



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